

Appl. No. : 09/905,335
Filed : July 13, 2001

AMENDMENTS TO THE CLAIMS

Please cancel Claim 46.

Please amend Claims 8, 33-38, 40 and 44 as indicated below.

1. (Previously Presented) A method for depositing a conductive material in cavities of a substrate having a barrier layer and a seed layer formed thereon, the method comprising the steps of:

removing certain portions of the seed layer from the top surface of the substrate using a pad material while preventing removal of other portions of the seed layer from the cavities of the substrate by applying an electric potential between the substrate and an electrode;

exposing portions of the barrier layer on the top surface of the substrate after removing certain portions of the seed layer; and

depositing the conductive material on the seed layer in the cavities of the substrate.

2. (Original) A method according to claim 1, wherein the step of removing certain portions of the seed layer from the top surfaces of the substrate comprises the step of polishing the certain portions of the seed layer using the pad material having abrasive particles.

3. (Original) A method according to claim 2, wherein the polishing step comprises rotating one of the pad material or the substrate in a circular direction at a rate of 50 to 2000 revolutions per minute for 2 to 60 seconds.

4. (Original) A method according to claim 2, wherein the polishing step comprises rotating one of the pad material or the substrate in a circular direction at a rate of 100 to 1200 revolutions per minute for 5 to 25 seconds.

5. (Original) A method according to claim 2, wherein the polishing step comprises the step of using the pad material to make contact with the certain portions of the seed layer on the top surface of the substrate at a pressure ranging from 0.05 to 5 pounds per inch.

6. (Original) A method according to claim 1, wherein the substrate comprises a dielectric layer.

7. (Original) A method according to claim 6, wherein the dielectric layer comprises a silicon dioxide layer.

Appl. No. : 09/905,335
Filed : July 13, 2001

8. (Currently Amended) A method according to claim 1, wherein the conductive material comprises one of a copper, aluminum, iron, nickel, chromium, indium, lead, tin, lead-tin alloys, nonleaded solderable alloys, silver, zinc, cadmium, titanium, tungsten, molybdenum, ruthenium, and combinations thereof.

Claims 9-32 (Canceled).

33. (Currently Amended) A method according to claim [[31]] 1 further comprising the step of applying an electric current density between the substrate and the electrode of 5 to 250 mA/cm² during the depositing step.

34. (Currently Amended) A method according to claim [[31]] 1 further comprising the step of applying an electric current density between the substrate and the electrode of 7 to 150 mA/cm² during the depositing step.

35. (Currently Amended) A method according to claim [[31]] 1 further comprising the step of applying an electric current density between the substrate and the electrode of 0.05 to 15 mA/cm² during the removal step.

36. (Currently Amended) A method according to claim [[31]] 1 further comprising the step of applying an electric current density between the substrate and the electrode of 0.1 to 10 mA/cm² during the removal step.

37. (Currently Amended) ~~A method according to claim 1 further comprising the step of A method for depositing a conductive material in cavities of a substrate having a barrier layer and a seed layer formed thereon, the method comprising the steps of:~~

removing certain portions of the seed layer from the top surface of the substrate using a pad material while preventing removal of other portions of the seed layer from the cavities of the substrate by applying an electric potential between the substrate and an electrode;

exposing portions of the barrier layer on the top surface of the substrate after removing certain portions of the seed layer;

depositing the conductive material on the seed layer in the cavities of the substrate; and

positioning the pad material between 1 micron to 2 millimeters from the substrate during the depositing step.

Appl. No. : 09/905,335
Filed : July 13, 2001

38. (Currently Amended) ~~A method according to claim 1 further comprising the step of A method for depositing a conductive material in cavities of a substrate having a barrier layer and a seed layer formed thereon, the method comprising the steps of:~~

removing certain portions of the seed layer from the top surface of the substrate using a pad material while preventing removal of other portions of the seed layer from the cavities of the substrate by applying an electric potential between the substrate and an electrode;

exposing portions of the barrier layer on the top surface of the substrate after removing certain portions of the seed layer;

depositing the conductive material on the seed layer in the cavities of the substrate; and

positioning the pad material on the substrate during the depositing step.

39. (Previously Presented) A method according to claim 38, wherein the pad material is positioned on the substrate at a pressure between 0.05 to 5 pounds per square inch.

40. (Currently Amended) ~~A method according to claim 1 further comprising the step of A method for depositing a conductive material in cavities of a substrate having a barrier layer and a seed layer formed thereon, the method comprising the steps of:~~

removing certain portions of the seed layer from the top surface of the substrate using a pad material while preventing removal of other portions of the seed layer from the cavities of the substrate by applying an electric potential between the substrate and an electrode;

exposing portions of the barrier layer on the top surface of the substrate after removing certain portions of the seed layer;

depositing the conductive material on the seed layer in the cavities of the substrate; and

applying a first electric potential between the seed layer and an electrode having the pad material attached thereto, the first electric potential being applied during the step of preventing removal of other portions of the seed layer from the cavities of the substrate.

41. (Previously Presented) A method according to claim 40, wherein applying the first electric potential makes the seed layer more negative than the electrode.

Appl. No. : 09/905,335
Filed : July 13, 2001

42. (Previously Presented) A method according to claim 40 further comprising the step of applying a second electric potential between the seed layer and the electrode, the second electric potential being applied during the step of depositing.

43. (Previously Presented) A method according to claim 42, wherein the value of the second electric potential is greater than the value of the first electric potential.

44. (Currently Amended) A method according to claim 1, wherein the polishing removing step comprises moving the pad material and the substrate with respect to each other.

45. (Previously Presented) A method according to claim 1 further comprising rotating and moving the substrate laterally.

46. (Cancelled)

Appl. No. : 09/905,335
Filed : July 13, 2001

SUMMARY OF INTERVIEW

Applicants thank the Examiner for the opportunity to speak with Applicants' representative in a telephone conference on December 22, 2004.

Exhibits and/or Demonstrations

None

Identification of Claims Discussed

Independent Claim 1

Identification of Prior Art Discussed

Tsai et al. (U.S. Patent No. 5,576,706); Uzoh et al. (U.S. Patent No. 5,911,617)

Proposed Amendments

None

Principal Arguments and Other Matters

In the telephonic interview, Applicants' representative pointed out that the secondary references may teach applying an electrical potential to the wafer during processing, but do not teach "preventing removal" by such electrical potential. In fact, the references teach the opposite, and a potential is rather applied to aid removal.

Results of Interview

Applicants agree to submit the arguments in writing and the Examiner will consider the amendments in view of the interview.